4. MINERAL RESOURCE DEVELOPMENT POTENTIAL

SECTION 4
MINERAL RESOURCE DEVELOPMENT POTENTIAL

4.1 MINERAL POTENTIAL

The long history of mineral production and development within the planning area documents the widespread abundance of minerals that were created by various geological processes throughout the region. Historical gold production is tied closely to the initial formation of the Idaho Territory in 1864 and with statehood in 1890. The state has had continuous mineral development for over 140 years, beginning with the early production of gold by individual prospectors and miners. This continued through development of the small underground gold, silver, lead, and zinc mines of the Elk City and Marshall Lake Mining District to the modern era of large tonnage/low grade gold mines. It also includes the development of various industrial minerals, such as sand and gravel, crushed aggregate, dimension stone, garnet, limestone, and clay. More recently the individual recreational miner looking for gold placers, garnets, gemstones, petrified wood, agate, or fossils pursues activity on federal and state lands.

Previous assessments of the mineral potential of Idaho have been completed by the US Geological Survey (1995) and the US Bureau of Mines (1988) and were useful in evaluating the current assessment of the planning area. However, these assessments were not site-specific and did not include the industrial minerals resource, which is an important part of the planning area.

The US Geological Survey (1995) completed a rigorous review and classification of various mineral deposit models in its report, *Assessment of Undiscovered Mineral Resources in the Pacific Northwest: A Contribution to the Interior Columbia Basin Ecosystem Management Project*. The report outlined areas where permissive geology is present and identified potential mineral deposit types within those areas.

The US Bureau of Mine's Availability of Federally Owned Minerals for Exploration and Development in Western States: Idaho (US Bureau of Mines 1988) identified and evaluated known mineral deposit areas and compared them to their availability on federal lands.

The current evaluation of the mineral resource potential within the planning area combines information from the US Geological Survey (1995) and the US Bureau of Mines (1988) reports and updated recent and historical information. Conclusions are based primarily on the historic occurrences of mines and prospects, level and value of mineral production, recent exploration activity, and presence or absence of favorable geology and operative geological processes.

Table 4-1 shows mineral production in Idaho from 1992 to 2002, based on data compiled by the Idaho Geological Survey in the annual reports, The Mineral Industry of Idaho (US Geological Survey 2004). This shows trends of various mineral commodities in order to provide a perspective of future potential activity. Gold and silver production has been reduced substantially from the mid 1990s through 2002 due to extremely low prices, exhaustion of ore reserves, closure of major mines, and loss of infrastructure. On the other hand, sand and gravel mining for construction and industrial use has increased moderately from 1992 to the present. The crushed stone industry, which includes limestone and other materials, has more than doubled in output from 1992 to 2002. Idaho has been the largest producer of abrasive garnets in the United States over the past several decades, with production from the Emerald Creek mines as the primary source. Where figures are available for dimension stone, it has shown dramatic increases from 1998 to 1999 and has probably continued to increase through 2003.

The recent mines and exploration activity in Idaho from 1994 to 2003 is shown in **Table 4-2.** There are no gold mines operating in the state today, whereas in 1994 there were five large open pit/heap leach gold mines in production. A recent positive trend in the gold industry is the increase of exploration projects from zero in 1999 to fourteen in 2003. This is due primarily to the dramatic increase in the price of gold over the past two years, which has stimulated gold exploration and may lead to future development.

The garnet mining industry is slated for expansion in 2005 at the Emerald Creek Mining Company property in Shoshone and Latah Counties. Exploration for clay at the Helmer-Bovill property in Lemhi County was conducted from 2000 to 2003. Decorative stone mines in Idaho increased from one in 1994 to five in 2003, although information on small producers is unavailable.

Table 4-1
Nonfuel Raw Mineral Production in Idaho 1992-2002

Mineral		1992 Quantity	1992 Value$ thousands	1993 Quantity	1993 Value $ thousands	1994 Quantity	1994 Value $ thousands	1995 Quantity	1995 Value $ thousands	1996 Quantity	1996 Value $ thousands	1997 Quantity
Antimony	metric tons	na	na	na	na	na	na	na	na	242	w	356
Clays (common)		na	na	na	na	na	na	1	$10	na	na	na
Garnet		na	na	na	na	na	na	na	na	na	na	na
Gemstones		na	$390	na	$566	na	$287	na	$346	w	w	w
Gold	kilograms	4,037	$44,744	w	w	5,600	w	8,850	$110,000	10,800	$135,000	7,490
Molybdenum	metric tons	w	w	na	na	5,500	w	w	w	w	w	w
Phosphate rock	mt. x,000	5,208	$84,000	4,355	$78,432	w	w	w	w	w	w	w
Pumice/pumicite	metric tons	55,525	$401	43,438	$327	w	w	w	w	159,000	$1,340	83,100
Sand and gravel												
Construction	mt. x,000	13,522	$40,728	13,600	$44,900	14,500	$46,300	13,200	$43,500	14,700	$46,100	14,800
Industrial	mt. x,000	728	$9,214	w	w	w	w	501	$8,720	646	$8,510	630
Silver	metric tons	254	$32,131	190	$26,232	162	w	182	$30,200	229	$38,300	341
Stone, crushed	mt. x,000	3,269	$19,200	4,602	$20,770	4,160	$20,300	3,210	$14,000	3,960	$20,200	3,910
Dimension stone		na	na	na	na	na	na	na	na	na	na	na
Combined value others		na	$78,980	na	$102,938	na	$279,000	na	$303,000	na	$242,000	na
	Total	**na**	**$309,788**	**na**	**$274,165**	**na**	**$345,887**	**na**	**$509,776**	**na**	**$491,450**	**na**
Crushed stone included in totals												
Limestone	mt.x,000	704	$3,120	316	$1,426	407	$1,400	869	$3,370	1,370	$7,920	1,150
Granite	mt.x,000	359	$1,865	382	$1,834	281	$1,100	611	$3,370	549	$3,060	140
Traprock	mt.x,000	1,013	$4,161	2,845	$10,866	2,230	$9,440	1,400	$5,720	1,680	$6,150	1,460
Quartzite	mt.x,000	w	w	564	$4,670	556	$1,800	328	$1,500	371	$3,110	w
Shell	mt.x,000	48	$200	w	w	w	w	8	$42	na	na	na
Miscellaneous stone	mt.x,000	w	w	418	$1,590	642	$3,370	na	na	2	$2	1,160
	Total	**2,124**	**$9,346**	**4,525**	**$20,386**	**4,116**	**$17,110**	**3,216**	**$14,002**	**3,972**	**$20,242**	**3,910**

Table 4-1
Nonfuel Raw Mineral Production in Idaho 1992-2002 *(continued)*

Mineral		1998		1999		2000		2001		2002		
		Value $ thousands	Quantity	Value $ thousands	Quantity	Value $ thousands	Quantity	Value $ thousands	Quantity	Value $ thousands	Quantity	Value $ thousands
Antimony	metric tons	w	242	w	449	w	w	w	na	na	na	na
Clays (common)		na	na	na	na	na	na	na	na	na	na	na
Garnet		na	na	na	na	na	na	na	na	na	na	na
Gemstones		$687	w	$321	w	$368	w	$411	w	$656	w	$460
Gold	kilograms	$80,100	w	w	w	w	w	w	w	w	w	w
Molybdenum	metric tons	w	w	w	w	w	w	w	w	w	w	w
Phosphate Rock	mt. x,000	w	w	w	w	w	w	w	w	w	w	w
Pumice/pumicite	metric tons	$758	73,400	$686	98,600	$917	w	w	w	w	w	w
Sand and gravel												
Construction	mt. x,000	$42,700	16,600	$52,400	15,500	$48,200	17,500	$55,700	15,000	$52,400	15,700	$57,700
Industrial	mt. x,000	$7,950	710	$8,470	711	$11,200	w	w	w	w	w	w
Silver	metric tons	$53,800	447	$73,200	416	$70,100	416	$66,900	w	w	w	w
Stone -crushed	mt. x,000	$18,700	4,180	$18,400	4,220	$19,000	3,500	$14,800	5,250	$22,500	3,420	$15,800
dimension stone		na	15,900	$4,710	39,300	$5,510	w	w	w	w	w	w
Combined value others		$264,000	na	$281,000	na	$250,000	na	$219,000	na	$213,000	na	$197,000
	Total	**$468,695**	**na**	**$439,187**	**na**	**$405,295**	**na**	**$356,811**	**na**	**$288,556**	**na**	**$270,960**
Crushed Stone included in totals												
Limestone	mt.x,000	$5,860	1,040	$4,030	1,020	$4,130	607	$1,920	564	$3,240	460	$2,890
Granite	mt.x,000	$243	256	$911	343	$1,280	240	$975	235	$1,090	160	$793
Traprock	mt.x,000	$6,420	1,900	$8,960	1,830	$7,620	1,990	$8,960	3,710	$14,700	2,140	$9,140
Quartzite	mt.x,000	w	466	$2,050	574	$4,090	495	$2,020	371	$1,580	356	$1,520
Shell	mt.x,000	na	23	$77	12	$87	17	$107	19	$134	24	$167
Miscellaneous stone	mt.x,000	$6,190	497	$2,320	320	$1,290	156	$774	355	$1,680	279	$1,280
	Total	**$18,713**	**4,182**	**$18,348**	**4,099**	**$18,497**	**3,505**	**$14,756**	**5,254**	**$22,424**	**3,419**	**$15,790**

na - not available
w - withheld to avoid disclosure
Source: USGS 2004
mt. x- millions of metric tons

Table 4-2
Recent Mines and Exploration in Idaho 1994-2003

MINING PROPERTIES Commodity/Mine Name	County	Significant Mining Events	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Silver/lead/zinc												
Lucky Friday Mine	Shoshone	Continues production, expands in 2005	*	*	*	*	*	*	*	*	*	*
Sunshine Mine	Shoshone	Closed mine in 2001, low prices, smelter closed	*	*	*	*	*	*	0	0	0	0
Galena Mine	Shoshone	Continues production, expands in future	*	0	0	*	*	*	*	*	*	*
Coeur Mine	Shoshone	Closed mine in 2001, low prices, smelter closed	*	0	*	*	0	0	0	0	0	0
Total Mines Active			4	2	3	4	3	3	2	2	2	2
Total Exploration Projects			1	2	2	2	3	2	2	2	2	3
Gold												
Beartrack Mine	Lemhi	Operated 1994-2000, closed in 2000	*	*	*	*	*	*	0	0	0	0
Grouse Creek Mine	Custer	Operated 1994-1995, closed in 1996	*	0	0	0	0	0	0	0	0	0
Black Pine Mine	Cassia	Operated 1991-1998, closed in 1998	*	*	*	0	0	0	0	0	0	0
De Lamar Mine	Owyhee	Operated 1980-1998, closed in 1998	*	*	*	*	0	0	0	0	0	0
Stibnite	Valley	Operated 1991-1998, closed in 1998	*	*	*	*	0	0	0	0	0	0
Yellowjacket Mine	Lemhi	Minor operation 1991-1999	*	*	*	0	0	0	0	0	0	0
Rescue Mine	Idaho	Minor operation 1991-1999	*	*	*	0	0	0	0	0	0	0
Total Mines Active			7	6	6	3	1	1	0	0	0	0
Total Exploration Projects			4	4	8	10	1	0	1	2	11	14
Molybdenum												
Thompson Creek Mine	Custer	Operated 1993-2003, expanded operation 2003	*	*	*	*	*	*	*	*	*	*
Cobalt, gold, copper												
Blackbird Mine	Lemhi	Exploration 1994-2003	*	*	*	*	*	*	*	*	*	*
Garnet												
Emerald Creek Mining Co.	Latah, Benewah	#1 garnet producer in US, expanded 2003	*	*	*	*	*	*	*	*	*	*
Clay												
Helmer-Bosvill Property	Latah	Exploration 2000-2003	0	0	0	0	0	0	*	*	0	*
Decorative stone												
Mines in Idaho	Boise, Custer,	Mines for decorative stone increased in 2001	1	1	1	1	1	1	2	2	5	5

* - Active mines; 0 - Inactive or closed mines

This compilation of data provides information regarding the level of activity statewide and is also expected to be reflected in the future activity within the planning area.

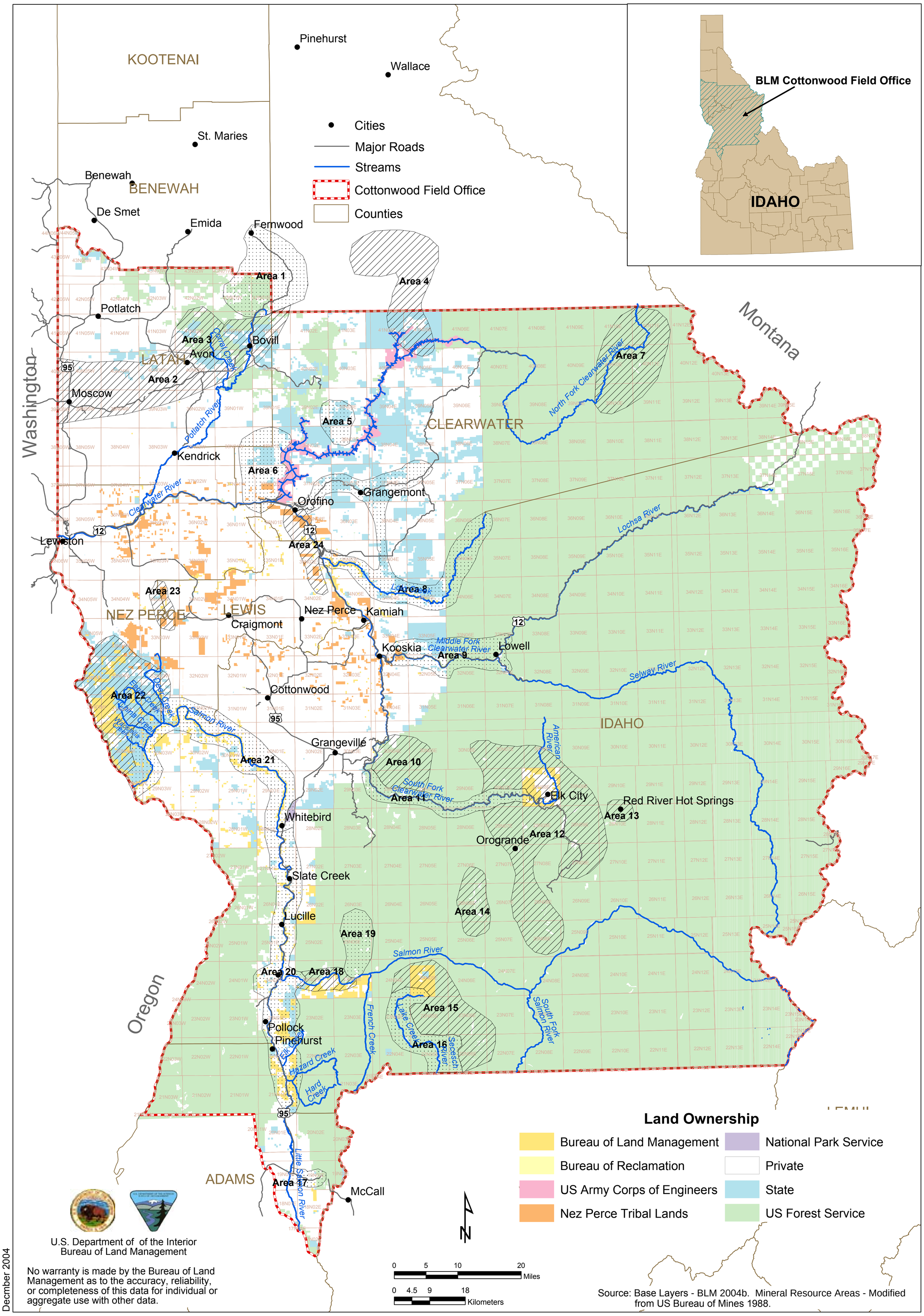
Figure 4-1 is a map of the mineral potential areas in the planning area . The outline is based on the presence of minerals and mines, favorable geological terrains, mineral deposit model types that may be present within those terrains, current mineral exploration/development activity, and review of the US Bureau of Mines report Availability of Federally Owned Minerals for Exploration and Development in Western States: Idaho (US Bureau of Mines 1988). The presence of significant BLM land blocks, either as managed lands or as acquired lands, was also taken into account in defining the areas.

The twenty-four areas outlined on **Figure 4-1** include those areas where there are a significant number of metal or industrial material mines and prospects. These areas are tied directly to **Table 4-3,** which lists the mineral potential for a number of commodities found in each area. This mineral potential assessment includes the assignment of the level of potential and the level of certainty, as defined in the BLM manual #3031 (Mineral Potential Classification System), and is outlined below. Each area can have more than one commodity with different levels of potential and certainty. For example in Area 1 (Emerald Creek Mining District) the mineral potential for garnet is H-D (high-direct evidence), whereas the potential for clay is L-A (low-insufficient evidence).

Reference to **Figure 4-1,** combined with assessment in **Table 4-3,** provides detailed information that can be used to determine mineral potential of BLM land that falls within those areas.

All the other undesignated areas that fall outside the defined areas are considered to have low or no potential for mineral resources, based on a lack of mines, prospects, or occurrences and unfavorable geological conditions. These areas may contain small isolated blocks of BLM land that have no mineral potential.

Assessment of the overall commodity potential throughout the entire Cottonwood Field Office RMP planning area is outlined in **Table 4-4.** This is a general assessment conclusion for each of the mineral commodities and is intended to provide an overview of the planning area. This includes all commodities that were evaluated within each of the main BLM mineral resource categories of leasable, acquired lands leases, locatable, and salable. Some commodities, such as salt or phosphate, may not occur within the planning area, but they have been examined and evaluated based on whether the geological environment may or may not be present in the region. **Figure (4-2)** is a map of the historic mineral resources of the Cottonwood planning area.



Potential Mineral Resource Areas

Cottonwood Field Office, Idaho

Alluvial Areas
sand/gravel
gold
black sands

Hard Rock Areas
all minerals

Figure 4-1

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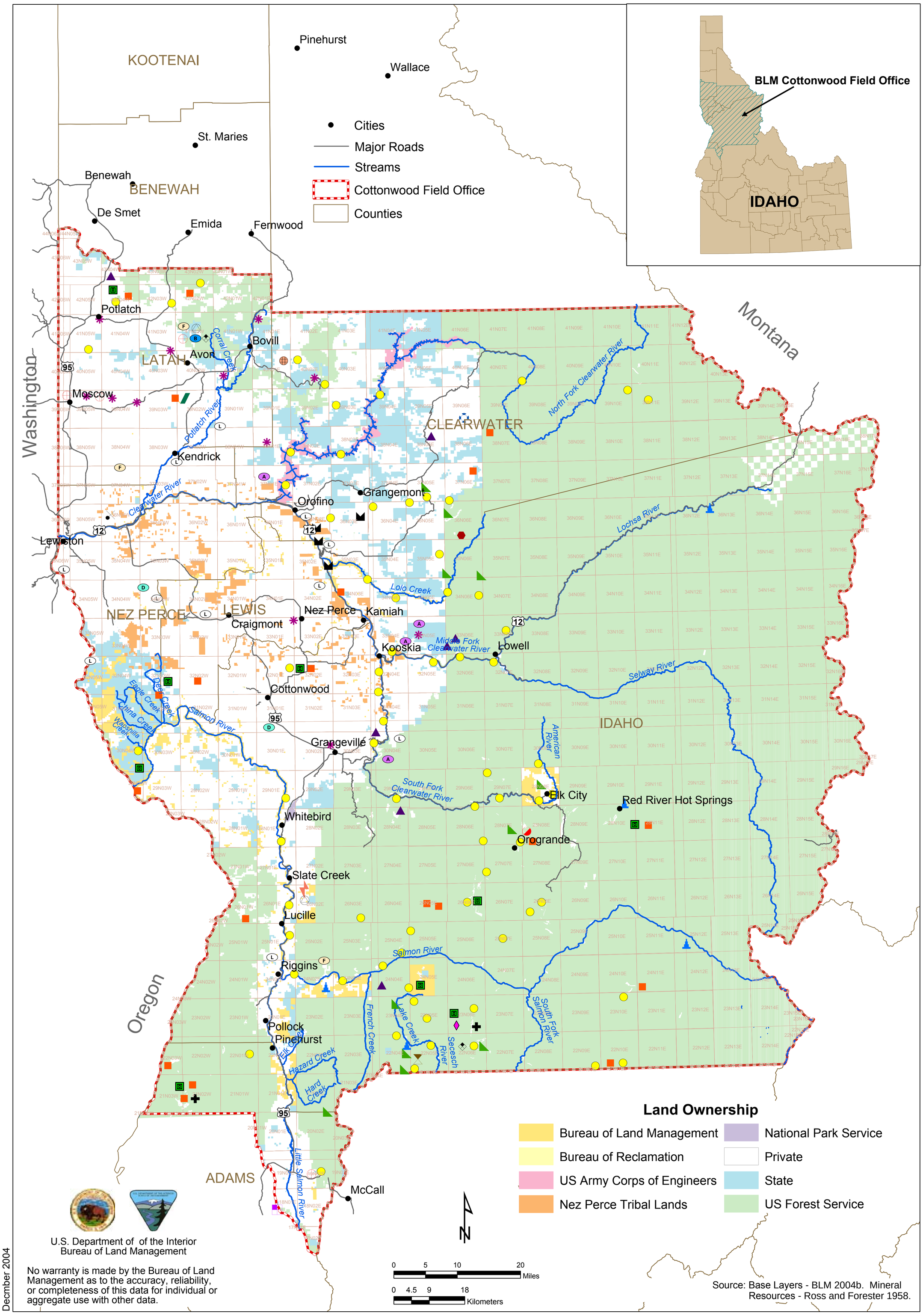

Mineral Resources

Cottonwood Field Office, Idaho

Figure 4-2

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Table 4-3
Mineral Potential in the Cottonwood Field Office Area

Area	Commodity	Mineral Potential	Potential Certainty	Mining District	Remarks
1	Garnet	H	D	Emerald Creek	Current and past production in Emerald Creek District and BLM leases
	Clay	L	A		Past clay production in nearby Bovill Mining District
2	Clay	H	C	Bovill District	Past major clay producer at the Bovill and other clay mining districts
	Sillimanite	L	B		Prospect northeast of Troy
	Silica	L	B	Bovill District	By-product production at the Bovill Clay Mine
3	Mica	M	C	Avon District	Past major producer in Idaho at Mica Mountain mines
	Beryllium	L	B	Avon District	Occurs in pegmatites at Mica Mountain mines
4	Kyanite	M	C	Goat Mountain	Widespread disseminated resource in schist at Goat Mountain
	Gemstones	L	B	Goat Mountain	Minor occurrences in schist at Goat Mountain
5	Gold placer	M	B	North fork Clearwater River	Minor gold placers around Jerico
	Black-sand	L	B	North fork Clearwater River	Monazite and other heavy minerals identified in placer sands
6	Gold placer	M	B	Northwest Orofino District	Minor placer gold in Dick Creek and Cedar Creek
	Black-sand	L	B	Northwest Orofino District	Monazite and other heavy minerals identified in placer sands
7	Silica	M	B	Cedar-Kelly Creek	Major prospect for silica in quartzites of Belt Series
8	Gold placer	M	C	Pierce District	Production of 385,000 ounces gold in N. fork Clearwater, Orofino, Lolo Creeks
	Gold lode	L	B	Pierce District	Minor fissure gold veins in schist/gneiss near granite
	Black-sand	L	B	Pierce District	Monazite and other heavy minerals identified in placer sands
9	Gold placer	M	B	Mid-fork Clearwater River	Minor gold production in alluvium and floodplain along river
	Black-sand	L	B	Mid-fork Clearwater River	Monazite and other heavy minerals identified in placer sands
10	Gold, silver, copper	M	B	Harpster District	Minor gold, silver, copper production from gash veins in diorite and wide silicified breccia zone containing gold/copper values of interest

Table 4-3
Mineral Potential in the Cottonwood Field Office *continued)*

Area	Commodity	Mineral Potential		Mining District	Remarks
		Potential	Certainty		
11	Gold placer	M	C	South fork Clearwater River	Minor placer gold production in main river
	Black-sand	L	B	South fork Clearwater River	Monazite and other heavy minerals identified in placer sands
12	Gold placer	M	C	Elk City/Tenmile District	Production 500,000 ounces gold from high meadow, bench, and alluvium
	Gold lode	M	C	Elk City/Tenmile District	Minor gold/silver from polymetallic veins in schist/gneiss near granite
	Black-sand	L	B	Elk City/Tenmile District	Monazite and other heavy minerals in large low-grade high-meadow gravels
13	Geothermal	L	B	Red River Hot Springs	Low temperature, non-geothermal resource
14	Gold placer	M	B	Buffalo Hump District	Minor gold placer in recent alluvium in local streams
	Gold lode	M	B	Buffalo Hump District	Production 27,000 ounces gold from fissure veins in metasediments
15	Gold placer	M	B	Marshall Lake District	Minor gold placer in Lake Creek combined with Warren District production
	Gold lode	M	B	Marshall Lake District	Small high-grade fissure veins in schist/gneiss near granite
	Black-sand	L	B	Marshall Lake District	Minor potential for black-sand concentration in small gold placers
16	Gold placer	M	B	Burgdorf-Warren District	Production of $10 million from high-meadow, bench, and alluvium
	Gold lode	M	B	Burgdorf-Warren District	Production of $2 million from polymetallic veins in schist/gneiss near granite
	Black-sand	L	B	Burgdorf-Warren District	Extensive drilling and sampling indicate resource of monazite and heavy min.
17	Zircon	L	B	Thorn Creek	Minor prospect of zirconium in recent gravels along Thorn Creek
18	Geothermal	L	B	Riggins Hot Springs	Low temperature hot spring, no geothermal resource
19	Gold placer	M	C	Florence District	Production one million ounces gold from high meadow and bench placers
	Lode gold	L	B	Florence District	Minor polymetallic veins in schist/gneiss near granite
	Black-sand	L	B	Florence District	Extensive drilling and sampling indicted resource of monazite sand heavy min.

Table 4-3
Mineral Potential in the Cottonwood Field Office *(continued)*

Area	Commodity	Mineral Potential	Potential Certainty	Mining District	Remarks
20	Placer gold	M	C	Salmon River below Riggins	Minor Production 38,000 ounces gold from terraces and floodplain gravels
	Lode gold	M	C	Salmon River below Riggins	Minor prospects for fissure gold along Western Idaho Suture Zone
	Black-sand	L	B	Salmon River below Riggins	Monazite and other blacks and heavy minerals identified in placer sands
	Sand/gravel	H	C	Salmon River below Riggins	Moderate production where accessible
21	Placer gold	L	C	Salmon River below Whitebird	Minimal placer gold production due to dilution of material
	Lode gold	L	C	Salmon River below Whitebird	Minor prospects or occurrences
	Black-sand	L	B	Salmon River below Whitebird	No information available
	Sand/gravel	L	C	Salmon River below Whitebird	No development due to poor access
22	Gold lode	L	B	Deer Creek Mine	Minor gold, silver, copper in fissure veins cutting metavolcanics
	Limestone	H	C	Lime Point Prospect	Extensive resource of 600 million tons in Martin Bridge Formation, poor access
23	Limestone	H	C	Mission Creek District	Current production of limestone for aggregate from Martin Bridge Formation
24	Limestone	H	C	Orofino/Harpster District	Past production of limestone from several pits in Martin Bridge Formation

Areas refer to locations on Figure 4-1.
Mineral potential based on BLM Mineral Potential Classification System #3031.

Table 4-4
Summary of Commodity Potential of the Cottonwood Field Office Area

Type	Commodity	Mineral Potential Potential	Certainty	District	Remarks
Leasable					
	Coal	L	B	none	Minor occurrence near Orofino within Columbia River Basalt sediments
	Peat	L	B	none	Minor occurrences in high meadow placer areas of central Idaho
	Geothermal	L	C	none	Low temperature warm springs and wells, nongeothermal resource
	Oil/Gas	L	B	none	Unfavorable geology, dry holes, and lack of current exploration
	Phosphate	0	C	none	No reported occurrence
	Sodium	0	C	none	No reported occurrence
	Sulfur	0	C	none	No reported occurrence
	Asphalt	0	C	none	No reported occurrence
Acquired Lands					
	Garnet	H	D	Emerald Creek	Major commercial production of garnets, recreation mining
	Clay	H	D	Bovill	Historical major production of clay along clay belt, recent exploration
Locatable					
	Gold - placer	M	B	Several districts	Major past placer production from several districts in central Idaho
	Gold - lode	M	B	Elk City, Marshall Lake, Warren, Burgdorf	Minor past production from small polymetallic gold quartz veins
	Silver/lead/ zinc/copper	L	B	Several districts	Minor past production from small polymetallic gold quartz veins
	Beryllium	L	B	Avon district	Minor occurrences in pegmatites mined for mica
	Cobalt/nickel	L	B	None	No reported occurrence
	Manganese	L	B	None	No reported occurrence
	Niobium/ tantalum	L	B	Several districts	Black-sands associated with gold placers, mineral identified
	Thorium/rare earths	L	B	Several districts	Black-sands associated with gold placers, mineral identified
	Titanium/ zirconium	L	B	Several districts	Black-sands associated with gold placers, mineral identified
	Antimony	L	B	None	Minor occurrence in polymetallic gold quartz veins

Table 4-4
Summary of Commodity Potential of the Cottonwood Field Office Area *(continued)*

Type	Commodity	Mineral Potential		District	Remarks
		Potential	Certainty		
	Barite	L	B	None	No reported occurrence
	Fluorspar	L	B	None	No reported occurrence
	Other garnet	M	B	Several districts	Black-sand associated with gold placers, mineral identified
	Gemstones	L	B	None	Minor occurrences in pegmatites mined for mica
	Gypsum/ anhydrite	L	B	None	No reported occurrence
	Mercury	L	B	None	No reported occurrence
	Mica/feldspar	M	B	Avon district	Past major production from pegmatites
Locatable Continued					
	Molybdenum	L	B	None	No reported occurrence
	Phosphate	O	C	None	No reported occurrences
	Kyanite/ refractories	L	B	Avon, Goat Mtn. districts	Minor production, possible disseminated kyanite at Goat Mountain
	Salt	O	C	None	No reported occurrences
	Tungsten	L	B	None	No reported occurrences
	Uranium	L	B	None	Minor occurrence associated with Black-sand placers
	Vanadium	L	B	None	Minor occurrence associated with Black-sand placers
Salable					
	Sand/gravel/ aggregate	H	D	None	Major production near urban center and for highway aggregate
	Pumice/ pumicite	L	B	None	No reported occurrences
	Silica/quartzite	L	B	Cedar-Kelly Creek	Prospect of unknown potential, minor prior production
	Limestone	H	C	Orofino, Lime Point	Past major production near Orofino, large resource identified
	Clay	L	C	None	No reported occurrence,
	Dimension stone	M	C	None	Demand increased for basalt, quartzite, limestone, and other lithologies

Mineral Potential based on BLM Mineral Potential Classification System, Manual #3031

This assessment provides a comprehensive evaluation for all minerals that have a reasonable possibility of occurring within the planning area. Any minerals that are not specifically mentioned and evaluated are considered to have no potential, based on a lack of identification anywhere within the planning area.

The BLM has applied the Mineral Potential Classification System to the assessment of mineral resources, as defined in BLM Manual #3031 and as outlined below.

BLM MANUAL #3031

Mineral Potential Classification System

LEVEL OF POTENTIAL

a. The geologic environment, the inferred geologic processes, and the lack of mineral occurrences do not indicate potential for accumulation of mineral resources.

L. The geologic environment and the inferred geologic processes indicate low potential for accumulation of mineral resources.

M. The geologic environment, the inferred geologic processes, and the reported mineral occurrences or valid geochemical/geophysical anomaly indicate moderate potential for accumulation of mineral resources.

H. The geologic environment, the inferred geologic processes, the reported mineral occurrences, or valid geochemical/geophysical anomaly, and the known mines or deposits, indicate high potential for accumulation of mineral resources. The "known mines and deposits" do not have to be within the area that is being classified but have to be within the same type of geologic environment.

ND. Minerals potential not determined due to lack of useful data. This does not require a level-of-certainty qualifier.

LEVEL OF CERTAINTY

A. The available data are insufficient or cannot be considered as direct or indirect evidence to support or refute the possible existence of mineral resources within the respective area.

B. The available data provide indirect evidence to support or refute the possible existence of mineral resources.

C. The available data provide direct but quantitatively minimal evidence to support or refute the possible existence of mineral resources.

D. The available data provide abundant direct and indirect evidence to support or refute this possible existence of mineral resources.

For determination of No Potential, use O/D. This class shall be seldom used, and when used it should be for a specific commodity only.

As used in this report, the term potential refers to ". . . potential for the presence (occurrence) of a concentration of one or more energy and/or mineral resources. It does not refer to or imply potential for development and/or extraction of the mineral resource(s). It does not imply that the potential concentration is or may be economic, that is, could be extracted profitably."

4.2 LEASABLE MINERALS

The Mineral Potential Classification Rating of Leasable Minerals for a variety of commodities is summarized in **Table 4-4.** All of the leased mineral lands, including fluid and nonfluid varieties, have a low potential for discovery or development due to geological conditions that are not favorable to the formation of these minerals.

4.2.1 Coal/Peat

There are no identifiable coal resources within the planning area. No commercial production is recorded, and there is only one small, poor quality coal prospect near Orofino. Minimal exploration information is available on the coal occurrence within the area.

In northeast Oregon, irregular lenticular beds of low quality lignite-grade coal have been identified intra-layered within the Columbia River Basalt flows. These have been investigated by a number of coal mining companies over the past decade. None of these coal layers are considered to be of commercial value due to a lack of continuity, low reserves, thick basalt overburden, and low quality material. Similar geological conditions are thought to occur within the planning area and would produce unfavorable environments for the development of significant coal beds.

Minor peat occurrences are identified from the high level meadows that were historically mined for placer gold, such as the Elk City, Florence, and Burgdorf-Warren Mining Districts. No peat was extracted from these high meadow areas for commercial use. There are no identifiable peat resources within the planning area.

The Mineral Potential Classification Rating **(Table 4-4)** for coal throughout the Cottonwood Field Office is **L-B** because of a lack of occurrences and an unfavorable geological environment.

The Mineral Potential Classification Rating **(Table 4-4)** for peat within the Cottonwood Field planning area is **L-B**, based on a minimum of occurrences and limited information.

4.2.2 Geothermal

There are only several warm water occurrences within the planning area. These include the Riggins Hot Springs and the Red River Hot Springs,

neither of which qualifies as a geothermal resource by the state. The low temperature of the water in these hot springs does not exceed the critical threshold of 212 degrees F established by the Idaho Department of Water Resources. Several warm water wells are located along the Salmon River and Little Salmon River near Riggins, but none qualify as a geothermal resource.

There are no areas classified as a KGRA by the Idaho Department of Water Resources, which is responsible for geothermal evaluation in the state (Idaho Department of Water Resources 2002).

The potential for developing geothermal resources is considered to be low, based on the data collected by the Idaho Bureau of Water Resources, which indicates the temperatures are not high enough to be ranked for future evaluation.

The Mineral Potential Classification Rating **(Table 4-4)** for geothermal resources in the Cottonwood Field Office area is **L-C** because of a lack of any KGRA within the planning area and previous sampling of water temperatures by the state agency.

4.2.3 Oil and Gas

Oil and gas exploration has been minimal within the planning area. However, during the higher oil/gas prices of the 1980s, land was leased extensively for oil and gas throughout the region. This leasing was probably of a speculative nature by either individuals or by oil companies to cover any potential exploration play elsewhere in the region.

There are only three exploratory oil/gas wells drilled within the planning area, in Nez Perce and Lewis Counties. The latest wells were drilled between 1974 and 1982 and were relatively shallow (less than 2,000 feet). No hydrocarbons were encountered. Very little information is available regarding the exploration target or the results of the drilling.

Geological conditions are not favorable for development of exploration targets due to the lack of favorable reservoir rocks, high temperature metamorphic terrain surrounding the Idaho Batholith, presence of younger Columbia River Basalts masking subsurface geophysical surveys, and presence of nonprospective Precambrian Belt Series rocks.

The Mineral Potential Classification Rating for oil/gas **(Table 4-4**) in the Cottonwood planning area is **L-C** due to the unfavorable geological terrain, lack of exploration geophysical surveys, and unsuccessful results of prior drilling.

4.2.4 Other Leasable Minerals

Other minerals that are included in the leasable category by the Mineral Leasing Act of 1920, as amended, include phosphate, sodium, sulphur, and asphalt. No significant occurrence of any of these leasable minerals has been identified within the planning area.

The geological conditions for the development of any of these other leasable minerals are not present within the planning area. Each of these minerals requires very specific geological environments in order to develop, and none of these conditions are present within the region.

The Mineral Potential Classification Rating for phosphate, sodium, sulphur and asphalt **(Table 4-4)** in the Cottonwood planning area is **O-C**. The unfavorable geological environment, inferred geological processes, and lack of mineral occurrences indicate there is no potential for accumulation of mineral resources in this category.

4.2.5 Acquired Lands Minerals Leases

4.2.5.1 Garnet

There are significant garnet resources on acquired land mineral leases within the Emerald Creek District, Latah, Benewah, and Shoshone Counties. Mining within this area has been continuous for over fifty years, with Idaho ranking as the number one abrasive garnet producer in the nation, based on production of the Emerald Creek Mining Company. Recreational placer mining for the public conducted by the Forest Service and other private operators along Emerald Creek has been highly successful.

Currently the BLM has issued three acquired land leases, covering 1,620 acres of land in the area, and historically there were 27 BLM leases involving 2,595.63 acres that are inactive–case closed.

The Mineral Potential Classification Rating **(Table 4-4)** for garnets in the acquired lease lands of the Cottonwood Field Office area is **H-D,** based on the historic continuous production, current mine development, and future expansion of the existing operation.

4.2.5.2 Clay

Clay deposits are developed just to the south of the Emerald Creek area in northeastern Latah County and extend as a clay belt across the county. Significant historical production from several clay pits has occurred over the past several decades. Currently there is no production from the area, but mineral exploration and evaluation has been conducted from 2000 to 2003.

The Mineral Potential Classification Rating **(Table 4-4)** for clay deposits in the Cottonwood Field Office area is **H-D** due to the past production levels, favorable geological conditions, and recent mineral exploration programs.

4.3 LOCATABLE MINERALS

A wide variety of locatable minerals is developed within the planning area due to the number of diverse geological environments that are considered to be favorable for development of different commodities. The Mineral Potential Classification rating for the locatable minerals is provided in **Table 4-4.** The principal locatable mineral commodities with high potential are garnet, clay, sand and gravel, and dimension stone.

4.3.1 Gold

There are a number of minor gold producers and prospects throughout the planning area that have significant historical production since discovery of gold in the 1860s. Major production is related to placer gold recovered from 1860 to 1880. Most of the placer deposits were mined out by the end of that period, and development was concentrated on lode deposits. Lode production was not nearly as valuable as the original placer mines and accounted for ten percent or less of the production of any of the mining districts.

The potential for future gold placer resources is considered to be **M-B,** based on the extent of prior production; however, only a few isolated remnants of placer ground are thought to be present along the main rivers and tributaries within the planning area. Information on the previous historical production is good, but data on the location of any remaining gold placer deposits is minimal.

Lode gold production has been limited to small polymetallic quartz veins, with limited extent or distribution within the planning area. Even in the larger districts, such as Elk City or Marshall Lake, the lode gold production has been small by mine standards elsewhere in the state. There is low potential for development of significantly large tonnage-low grade gold resources within the planning area, based on the small size of the veins, lack of major structures, such as faults or shear zones, limited alteration halos surrounding the veins, and lack of reactive host rocks. However there is moderate potential for small high-grade underground operations that may be developed in the future, based on the continued exploration activity for this type of resource, price of gold, operating regulations, and environmental considerations.

The potential for future major large tonnage gold development is **L-B,** but the potential for small high-grade operations is **M-B**.

4.3.2 Silver, Lead, Zinc, Copper

Within the planning area, there has been minimal production of silver, lead, zinc, and copper with any value associated and as a by-product of gold mining. The only silver, base metal, copper production has been from small polymetallic gold quartz veins found in metamorphics near the margins of the intrusive Idaho Batholith. The values have been so low that no figures are available on the amount or value of this production within the major gold mining districts of Elk City, Marshal Lakes, Florence, Pierce, or Burgdorf-Warren.

The potential for silver, lead, zinc, and copper within the Cottonwood planning area is **L-B**, based on limited previous production and unfavorable geological conditions for the development of significant deposits.

4.3.3 Strategic Minerals

Strategic minerals have been identified in the planning area, but there has been no significant production of any of these minerals. Most of these occur in small lode prospects or have been recognized in black-sand placer deposits that may be mined for other minerals, such as gold or garnet. Generally, recognition of these minerals is difficult due to their fine-grained size in placer deposits and previous placer miners' lack of interest because mining these minerals is not economical. Information regarding the extent or distribution of the strategic minerals is minimal, with only a qualitative assessment in a few of the occurrences.

4.3.3.1 Beryllium

Minor beryllium is associated with beryl at the Avon District in Latah County. The potential for beryllium is low, based on the lack of mineral prospects and no prior production within the planning area. Only minimal information is available on the location or distribution of beryllium within the planning area.

The Mineral Potential Classification Rating **(Table 4-4)** for beryllium in the Cottonwood Field Office area is **L-B**, due to the lack of occurrences**.**

4.3.3.2 Cobalt and Nickel

There are no cobalt/nickel prospects or occurrences in the planning area. The geological environment for these commodities is generally associated with magmatic segregation of heavy minerals in differentiated mafic intrusives. These conditions are not present in the Idaho Batholith terrain of central Idaho.

The Mineral Potential Classification Rating **(Table 4-4)** for cobalt-nickel within the Cottonwood Field Office area is **L-B**, due to the lack of occurrences or prospects.

4.3.3.3 Manganese

There are no occurrences of manganese within the planning area. There is no evidence of primary source rocks or the weathering conditions to produce manganese enrichment within the planning area.

The Mineral Potential Classification Rating **(Table 4-4)** for manganese within the Cottonwood Field Office area is **L-B**, because of unfavorable geological environment and a lack of prospects.

4.3.3.4 Niobium and Tantalum

There are numerous occurrences of niobium and tantalum within the planning area. In central Idaho most of the black-sand occurrences contain niobium and tantalum, which are associated with many of the gold placers. Information is minimal regarding distribution of niobium and tantalum within the planning area.

The Mineral Potential Classification Rating **(Table 4-4)** for niobium and tantalum within the Cottonwood Field Office area is **L-B,** based on the identification of these minerals within the gold placer prospects throughout the region.

4.3.3.5 Thorium and Rare Earths

Black-sand deposits containing monazite and thorite are located throughout the alluvial placers in central Idaho and are underlain by the Idaho Batholith. Numerous black-sand placer deposits have been identified in the planning area. Specific information regarding the quality or quantity of material in the black-sand deposits of central Idaho is minimal.

The Mineral Potential Classification Rating **(Table 4-4)** for thorium and rare earths within the Cottonwood Field Office area is **L-B,** due to limited black-sand prospects in the region.

4.3.3.6 Titanium, Zirconium, and Hafnium

Only a few occurrences of titanium, zirconium, and associated hafnium are identified in the planning area. These are primarily found within black-sand prospects along the main rivers in the region and as an accessory mineral in the clay mining at the Bovill deposit, Latah County. Most of these minerals are found as accessories in granitic rocks that are concentrated as detrital grains in black-sand placer deposits. Information concerning the distribution of these minerals is limited.

The Potential Mineral Classification Rating **(Table 4-4)** for titanium, zirconium, and hafnium within the Cottonwood planning area is **L-B**, based on the presence of black-sand prospects along the major drainages, although only limited information is available.

4.3.4 Other Minerals

There is a wide variety of other minerals, some of which are found within the planning area as primary occurrences or deposits. Sometimes they are recovered as by-products in the mining of a primary mineral, such as gold. Other mineral types exhibit a specific geological environment, such as molybdenum or tungsten deposits, which may be present within the region.

4.3.4.1 Antimony

Antimony is not prevalent in the region and occurs only as a minor constituent in the polymetallic gold veins, which are related to the Idaho Batholith. It has been identified at the Marshall Lake Mining District.

The Potential Mineral Classification Rating **(Table 4-4)** for antimony in the Cottonwood Field Office area is **L-B**, based on the lack of primary mineral occurrences.

4.3.4.2 Barite

There are no reported occurrences of barite within the planning area. Geologically, barite is found within veins in granitic intrusives and as bedded strata-bound deposits in black shale sedimentary sequences. The primary supplier of barite to the US is China. There are significant resources of barite in northern Nevada that could be reopened in the future if required.

The Potential Mineral Classification Rating **(Table 4-4)** for barite in the Cottonwood Field Office area is **L-B**, due to a lack of occurrences.

4.3.4.3 Fluorspar

Fluorite is sometimes found as a constituent in mineral deposits associated with Tertiary plutons in central Idaho. There are no fluorspar prospects or mines within the planning area. The primary supplier of fluorspar in the US is Mexico, which has extensive reserves for the future.

The Potential Mineral Classification Rating **(Table 4-4)** for fluorspar in the Cottonwood Field Office area is **L-B**, due to a lack of prospects in the region.

4.3.4.4 Garnet

Several garnet prospects occur within black-sand placers within the planning area, besides those identified in the Emerald Creek area. Garnet is found in the metamorphic aureole surrounding intrusive rocks and is concentrated as detrital grains in placer deposits. The geological environment is favorable for the development of garnet-bearing placers.

The Potential Mineral Classification Rating **(Table 4-4)** for garnet in the Cottonwood Field Office area outside of the Emerald Creek Mining District, Latah County, is **M-B,** based on the identification of garnet in nearly all of

the black-sand placer deposits, although information regarding the quality or quantity of the material is limited.

4.3.4.5 Gems

Gemstones are found at a number of localities in Idaho, primarily in the Emerald Creek district of Latah County. Geological environments considered favorable for gemstones include high-grade metamorphic terrains and late stage intrusive phases of the Tertiary plutons. Placer deposits of black-sand may contain concentrations of precious or semiprecious gemstones. None have been reported in the planning area. Recreation miners are the primary source of local gemstones, and there is no feasible future for commercial development.

The Potential Mineral Classification Rating **(Table 4-4)** for gems in the Cottonwood Field Office area is **L-B**, due to a limited number of occurrences.

4.3.4.6 Gypsum and Anhydrite

There are no known occurrences of commercial gypsum or anhydrite within the planning area. These minerals form primarily from evaporite sequences in unique sedimentary environments and as hydrothermal emanations from igneous sources.

The Potential Mineral Classification Rating **(Table 4-4)** for gypsum/anhydrite in the Cottonwood Field Office area is **L-B**, due to a lack of occurrences**.**

4.3.4.7 Mercury

There are no occurrences of mercury within the planning area. The geological environment for mercury is primarily in older, shallow, hot-spring epithermal deposits that may contain gold and silver. There are no identified Tertiary age hot-springs within the planning area.

The Potential Mineral Classification Rating **(Table 4-4)** for mercury in the Cottonwood Field Office area is **L-B**, due to a lack of occurrences.

4.3.4.8 Mica, Feldspar, and Associated Pegmatite Material

Numerous occurrences of mica, feldspar, and associated pegmatite minerals are present in the planning area. There has been significant historical production of these materials at Mica Mountain in the Avon District, Latah County. This area has been inactive for a number of years due to the lack of a commercial market for the material.

The Potential Mineral Classification Rating **(Table 4-4)** for mica, feldspar, and associated pegmatite material in the Cottonwood Field Office area is **M-**

B, due to the major past production of mica and favorable geological environments.

4.3.4.9 Molybdenum

There are no molybdenum prospects or occurrences within the planning area. The significant deposits of molybdenite of the climax type are generally associated with small multiphase silicic plutons containing associated breccia zones. However, these are often not recognized at the surface due to the depths of emplacement. Exploration and the discovery of blind molybdenum deposits at depths of a few hundred to a few thousand feet is a possibility within the region. Information on the location of such systems is virtually nonexistent.

Most of the molybdenum in the US is supplied by the Henderson Mine in Colorado and the Thompson Creek Mine in Idaho and as a by-product of the porphyry copper producers.

The Potential Mineral Classification Rating **(Table 4-4)** for molybdenum in the Cottonwood Field Office area is **L-B,** based on the lack of significant prospect, but with the recognition that favorable geological terrain is present for development of potential deep blind targets of the climax type.

4.3.4.10 Phosphate

All significant phosphate deposits are located in southeast Idaho, within a unique sedimentary unit (Phosphoria Formation) of Permian age. There are no phosphate prospects within the Cottonwood Field Office planning area, and the geological environment for the formation of phosphate deposits is nonexistent. Nearly of the US phosphate comes from southeast Idaho and Florida.

The Potential Mineral Classification Rating **(Table 4-4)** for phosphate in the Cottonwood Field Office area is **O-C**, due to the lack of favorable host rocks or favorable conditions to form these deposits.

4.3.4.11 Refractory Minerals

The principal refractory mineral in the planning area is kyanite, which is reported to occur over a broad area of the Goat Mountain area, Shoshone County. The geologic condition favorable for development of refractory minerals is in the contact zones between the Idaho Batholith and older argillaceous rocks of the Belt Series. There is only limited information on the presence or distribution of kyanite or other refractory minerals within the region of central Idaho.

There are no BLM lands near the Goat Mountain prospect area.

The Potential Mineral Resource Classification **(Table 4-4)** for refractory minerals within the Cottonwood Field Office area is **L-B,** based on a limited number of occurrences and lack of information regarding the distribution of these minerals.

4.3.4.12 Salt

There are no indications of any salt occurrences or prospects within the planning area. The geological environment for salt is in evaporite sedimentary sequences, none of which are present within the planning area.

The Potential Mineral Resource Classification **(Table 4-4)** for salt within the Cottonwood Field Office area is **O-C,** due to no prospects and an unfavorable geological environment.

4.3.4.13 Tungsten

There are no tungsten prospects within the planning area. The geological conditions for the formation of tungsten deposits is considered to be low, except in the Wallowa-Seven Devils terrain, where a few prospects are located. There is no BLM land located near any of the few tungsten prospects that occur in the region.

The Potential Mineral Resource Classification **(Table 4-4)** for tungsten within the Cottonwood Field Office area is **L-B**, based on the lack of prospects and limited data.

4.3.4.14 Uranium

There are no uranium prospects within the planning area. It has been identified in black-sand placer deposits associated with monazite, primarily in the southern regions of the planning area. However information on the distribution or quality of the material is not available.

The Potential Mineral Resource Classification **(Table 4-4)** for uranium within the Cottonwood Field Office area is **L-B,** based on a lack of significant prospects and limited information.

4.3.4.15 Vanadium

Vanadium has been identified in black-sand deposits in central Idaho. Geological conditions favorable for vanadium include the phosphate-bearing Phosphoria Formation in southeast Idaho. There is no similar geological environment in northern Idaho.

The Potential Mineral Resource Classification **(Table 4-4)** for vanadium within the Cottonwood Field Office area is **L-B,** due to a lack of prospects and unfavorable geological conditions.

4.4 SALABLE MINERALS

There are several salable materials mine sites within the planning area, primarily sand, gravel, and aggregate pits developed in response to the construction industry. Limestone is another commodity that is in demand for crushed aggregate, as well as in the cement industry. The commodity potential of the salable material in the Cottonwood Field Office area is presented in **Figure 4-4.**

4.4.1 Sand, Gravel, and Quarry Rock (Aggregate)

The sand, gravel, and crushed aggregate industry are developing substantial resources on private and state lands within the planning area in order to meet the expanded demand for construction and industrial materials. Currently there are no material sales contracts on BLM lands in the planning area.

Development of many of the potential material sites is restricted, due to local zoning laws that inhibit development of the local resource. This results in evaluating deposits that are further removed from the commercial usage site and results in searching areas that could affect future development on BLM land.

The Mineral Potential Classification Rating (**Table 4-4)** for sand, gravel, and crushed aggregate in the Cottonwood Field Office area is **H-D**, based on the high level of production and expansion of demand for this material by the construction industry.

4.4.2 Pumice and Pumicite

Nearly all of the pumice and pumicite is located in southern Idaho, where there are significant supplies and major commercial development. There are no known significant occurrences of pumice or pumicite within the planning area.

The Mineral Potential Classification Rating **(Table 4-4)** for pumice and pumicite within the Cottonwood Field Office area is **L-B**, based on a lack of prospects.

4.4.3 Silica and Quartzite

Only minor occurrences of silica have been noted in the planning area at the Bovill and Joel Silica deposits in Latah County and the Cedar Creek-Kelly area of Idaho County. Quartz was recovered as a by-product of the clay operations at the Bovill clay operations.

The Mineral Potential Classification Rating **(Figure 4-4)** for silica/quartzite within the Cottonwood Field Office area is **L-B**, based on the lack of occurrences and minimal information concerning the distribution or quality of the material.

4.4.4 Limestone

Limestone prospects and historical mines are located throughout the planning area, with significant past production and minor current operations for crushed aggregate. Demand for limestone is limited, although there are significant resources available. Lime Point along the Snake River in Nez Perce County is an example of a large resource of limestone, although the access is very limited.

The Mineral Potential Classification Rating **(Figure 4-4**) for limestone within the Cottonwood Field Office area is **H-C**, based on the history of previous production, widespread distribution of limestone layers, and the large number of prospects.

4.4.5 Clay

The most significant clay production in the region came from the Bovill and other deposits in northern Latah County. These have been described under the acquired land lease section of the report. Elsewhere there is limited information regarding clay prospects or occurrences, although there is a large area of potential clay-bearing material within the Columbia River Basalts.

The Mineral Potential Classification Rating **(Figure 4-4)** for clay outside of the Bovill Clay district is **L-B**, due to the presence of very few mineral prospects outside of the historic mine areas with unknown quantitative information.

4.4.6 Dimension Stone

There are a few potential dimension stone localities within the planning area. The geological terrain is favorable for the presence of dimension stone within the Columbia River Basalts, Martin Bridge limestone, and granitic phases of the Idaho Batholith. High demand for dimension stone by the construction and landscaping industries has developed near the urban growth centers. Locations of favorable dimension stone sites cannot be identified due to the specific quality of the material that is required.

The location of potential BLM land that could be involved in future mine operations cannot be identified until site-specific material is identified, evaluated, and developed.

The Mineral Potential Classification Rating **(Figure 4-4)** for dimension stone in the Cottonwood Field Office area is **M-C**, based on the moderate level of demand and the presence of favorable geological units scattered throughout the region.

4.5 CONCLUSIONS

The Cottonwood Field Office planning area contains significant resource potential for a wide variety of nonfuel minerals and material commodities.

The region has had continuous mineral development for over 140 years, including the initial rich placer gold along the major rivers, high-grade gold veins in the major districts, such as the Elkhorn Mining District, and more recently the extensive garnet and clay mining at the Emerald Creek District. Within the past decade development of various industrial minerals, including sand, gravel, and aggregate, dimension stone, and limestone, has expanded or contracted in response to urban growth and construction.

The mineral commodities within the Cottonwood planning area are classified for the potential of locatable, salable, leasable (fluids and solids), and acquired land leases according to the criteria outlined in BLM Manual Section #3031. This mineral resource classification is based on a critical assessment of a number of factors, including presence or absence of a significant number of mines or prospects, the development or expansion of existing operations, success or failure of exploration projects, favorable geological terrain, and the level of available information regarding the commodities present. High mineral potential classification was assigned to the following commodities:

- Garnet (abrasive and recreational) in the Emerald Creek District;
- Clay in the Bovill Clay District;
- Sand, gravel, and aggregate in the Salmon and Clearwater Rivers;
- Dimension stone located throughout the planning area; and
- Limestone along a belt from Riggins to Orofino, with a large resource identified at Lime Point along the Snake River.

Strategic minerals were evaluated and appear to have a low potential, but the information is limited regarding distribution or occurrence for important black-sand placer minerals, such a niobium and tantalum, thorium and rare earths, and titanium and zircon, which are present along the major river systems within the region.

All other minerals have a low or moderate potential, based on a lack of significant prospects or occurrences and other indirect evidence derived from a limited amount of information.

There is low potential for energy resources, including oil and gas, coal, and geothermal, based on the quantity and quality of the few prospects or occurrences and the generally unfavorable geological conditions for the formation of these resources.

The larger lode gold mining districts at Elk City and Marshall Lake are not considered to have significant potential for major deposits, based on limited remaining resources, small size of existing veins with no apparent major fracture or fault zones, no widespread alteration halos indicative of a major

hydrothermal system, and lack of reactive host rocks. Small high-grade vein systems have the best potential for exploration and development. The placer gold districts have been extensively mined, with very limited resource remaining, except possibly in the high meadow deposits and in isolated bench placers. Information regarding evaluation of these remaining lode and placer deposits is very limited.

Federal restriction on land entry and usage seriously inhibits the timely exploration, evaluation, and development of mineral resources critical to the economy and maintaining the current standard of living within the United States. It is important to maintain a balance among the competing demands for mineral resource development, recreational opportunities, and environmental protection.

5. RECOMMENDATIONS

SECTION 5
RECOMMENDATIONS

The following recommendations are made regarding the assessment and evaluation of the mineral resources potential both on and near the BLM land within the Cottonwood planning area. Understanding the short- and long-term consequences of decisions regarding the management of mineral resources is important in future land management goals. It is important to maintain a balance between mineral resources development which are essential for the modern technology-based economic system and preservation and protection of the important ecological systems.

Mineral deposits are unique concentrations of mineral commodities that reach commercial potential in only a very few localities. Similar conclusions can be reached for the ecological systems that are equally important in providing a livable and healthful environment. Both of the systems are mutually dependent in order to maintain the current standard of living and economic growth of the United States.

The following recommendations are presented:

- Review prospective valuable mineral classifications annually and update as necessary. Over time additional data from federal, state, and industry sources will provide more comprehensive information to assess the mineral resource potential.
- Identify and evaluate areas or commodities that require additional assessment for a critical review, primarily for the strategic minerals found in the black-sand deposits. Limited information is available on the distribution of the strategic minerals that are identified in the black-sand placer deposits, including niobium and tantalum, thorite and rare earths, and titanium and zirconium.

- A higher level of mineral assessment should be completed within current areas considered for withdrawal status. This would include evaluation of placers containing gold and black-sand deposits that may have the strategic minerals niobium and tantalum or thorium and rare earths. In addition, sand and gravel potential within critical rivers systems should be examined.

6. REFERENCES

SECTION 6
REFERENCES

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7. GLOSSARY

SECTION 7
GLOSSARY

ACQUIRED LANDS. Acquired lands, as distinguished from public lands, are those lands in federal ownership that the government has obtained by purchase, condemnation, or gift or by exchange for such purchased, condemned, or donated lands or for timber on such lands.

ALLUVIAL SOIL. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

ALLUVIUM. Clay, silt, sand, gravel, or other rock materials transported by moving water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in rivers, floodplains, lakes, and shores and in fans at the base of mountain slopes.

ENVIRONMENTAL IMPACT STATEMENT (EIS). A formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.

IMPACT. The effect, influence, alteration, or imprint caused by an action.

LEASABLE MINERALS. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium and sodium minerals, and oil and gas. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

LOCATABLE MINERALS. Minerals or materials subject to claim and development under the Mining Law of 1872, as amended. Generally include

metallic minerals, such as gold and silver, and other materials not subject to lease or sale (such as, some bentonites, limestone, talc, and some xeolites). Whether or not a particular mineral deposit is locatable depends on such factors as quality, quantity, minability, demand, and marketability.

MINERAL ENTRY. Claiming public lands (administered by the BLM) under the Mining Law of 1872 for the purpose of exploiting minerals. May also refer to mineral exploration and development under the mineral leasing laws and the Material Sale Act of 1947.

MINERAL MATERIALS. Common varieties of such materials as sand, building stone, gravel, clay, and moss rock obtainable under the Minerals Act of 1947, as amended.

MINING LAW OF 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the General Mining Laws or Mining Laws.

PALEONTOLOGICAL RESOURCES. The physical remains or other physical evidence of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for correlating and dating rock strata and for understanding past environments, environmental change, and the evolution of life.

PATENT. A grant made to an individual or group conveying fee simple title to selected public lands.

PATENTED CLAIM. A claim on which title has passed from the federal government to the mining claimant under the Mining Law of 1872.

PLANNING AREA. The geographical area for which land use and resource management plans are developed and maintained. In this case, the planning area is the Cottonwood Field Office boundary.

PUBLIC LAND. Any land and interest in land (outside of Alaska) owned by the United States and administered by the Secretary of the Interior through the BLM.

RESOURCE MANAGEMENT PLAN (RMP). A land use plan that establishes land use allocations, multiple-use guidelines, and management objectives for a given planning area. The BLM has used the RMP planning system since about 1980.

SALABLE MINERALS. Those minerals or materials designated as salable under the General Mining Law of 1872, as amended. They include common varieties of sand, stone, gravel, pumice, cinder, clay, and petrified wood.

SPLIT ESTATE. Split estate lands occur when the federal government owns and manages the mineral estate and another party owns the surface lands.

WEATHERING. Deep weathering refers to the physical disintegration and chemical decomposition of the rock that produces an in situ mantle of material, mainly clay in composition that is several tens of feet deep, rather than a thin normal surface soil weathering a few inches deep.

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